NATIONAL RESEARCH COUNCIL

COMMISSION ON PHYSICAL SCIENCES, MATHEMATICS, AND APPLICATIONS

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March 20, 1995

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

DOCKET FILE COPY ORIGINAL

Re: ET Docket No. 94-32

In the Matter of

Allocation of Spectrum Below
5 GHz Transferred from Federal
Government Use

Dear Mr. Caton:

Transmitted herewith by the National Academy of Sciences, through the Committee on Radio Frequencies of the National Research Council, are an original and nine (9) copies of its comments in the above-referenced proceedings.

If additional information is required concerning this matter, please communicate with this office.

Sincerely yours,

Robert L. Riemer

Robert L. Riemer
Senior Program Officer

Enclosure

cc: Members of CORF
Mr. Paul J. Feldman, Esq.
Dr. Donald C. Shapero

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
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COMMENTS OF THE COMMITTEE ON RADIO FREQUENCIES OF THE NATIONAL ACADEMY OF SCIENCES

The National Academy of Sciences, through the National Research Council's Committee on Radio Frequencies (hereinafter, "CORF"), hereby submits its comments in response to the Commission's Second Notice of Proposed Rulemaking, FCC 95-47, released February 17, 1995, in the above-captioned proceeding ("Second Notice"). CORF represents the interests of the Earth Exploration-Satellite Service, the Space Research Service, the Radio Astronomy community, and other users of the radio spectrum engaged in scientific research. In these Comments, CORF supports the Commission's proposed limited restrictions on the use of the reallocated 2390-2400 MHz band, in order to protect the important planetary research conducted at the National Astronomy and Ionospheric Center ("NAIC") at Arecibo, Puerto Rico.

I. Introduction

This proceeding was commenced subsequent to a Preliminary Spectrum Reallocation Report (the "Report") issued by the National Telecommunications and Information Administration ("NTIA"). That Report recognized that radio astronomy constitutes such a unique, immensely important[1], yet easily interfered with[2], use of the spectrum that those portions of the spectrum currently allocated exclusively to the Radio Astronomy Service ("RAS") should retain that exclusive allocation, and that the reallocation of neighboring frequency bands should be subject to conditions that restrict potential harm to radio astronomy.

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[1]As noted in more detail in Comments submitted in response to the Notice of Inquiry in this proceeding, radio astronomy is a vitally important tool used by scientists to study our universe. For example, through the use of radio astronomy, scientists have recently discovered the first planets outside the solar system, circling a distant pulsar. Furthermore, as noted in the Report, in addition to increasing knowledge of our world and the universe, radio astronomy has produced substantial benefits through the development of very-low-noise receivers and many other applications used in a variety of other radio applications.

[2]The emissions that radio astronomers detect are extremely weak--a typical radio telescope receives only about one-trillionth of a watt from even the strongest cosmic source. Radio astronomy is therefore particularly vulnerable to interference not only from licensed and unlicensed users in bands allocated to radio astronomy, but also from spurious and out of band emissions from users of neighboring bands.

CORF was particularly concerned about potential interference to the operations of the NAIC at 2370-2390 MHz.

CORF was pleased that the Commission recognized some of these concerns in the First Report and Order wherein it allocated the 2390-2400 MHz band to unlicensed Part 15 Personal Communications Services (PCS) devices and upgraded the Amateur Service allocation in the 2402-2417 MHz band, while retaining the Part 15 and industrial, medical, and scientific (ISM) use. Users of the Amateur Service have generally been good neighbors with the NAIC, and while CORF has some remaining concerns about potential interference from unlicensed PCS operations, it believes that allocation of these bands to other services could have resulted in even more damaging interference than that which may occur from PCS.

In comments filed earlier in this proceeding, CORF suggested that the Commission enact some limited restrictions on uses of the 2390-2400 and 2402-2417 MHz bands, in order to protect operations at the NAIC. Such suggestions had to be made without prior knowledge regarding the services that the Commission would allocate to the bands at issue. In light of the allocations to the Amateur and Part 15 PCS services, some of the urgency has been removed from some of CORF's proposals. CORF believes that the version of the requested restrictions proposed in the Second

Notice, slightly modified as noted herein, properly balances the needs of radio astronomers and other users of the spectrum.

II. Restrictions on the Use of the 2390-2400 and 2402-2417 MHz Bands

As was noted above, the NAIC has had minimal conflicts with Amateur Service users in Puerto Rico, and any such conflicts have been resolved amicably. CORF hopes and believes that any such future conflicts will continue to be resolved though local negotiations.

While the power and antenna limitations in Part 15 should minimize potential interference from most unlicensed PCS operations, CORF still believes that it is necessary to prohibit aeronautical uses of such devices operating in the 2390-2400 MHz band. See Second Notice at para. 56. Any aeronautical uses making air-to-ground communications in these bands would be very damaging to research conducted at Arecibo. Accordingly, CORF requests that the Commission add a footnote to the proposed allocations at 2390-2400 MHz specifically prohibiting any aeronautical use by unlicensed PCS devices in those frequencies. A similar restriction should be placed in Part 15 of the rules.

In regard to terrestrial uses, CORF recognizes that many such uses of unlicensed PCS in areas near the NAIC should not create harmful interference. And while CORF recognizes the

difficulty in regulating mobile uses of unlicensed PCS, CORF fears that the greatest potential for interference could come from fixed uses that would project signals into the horizon, and/or directly toward the NAIC. An example of such a use would be connection of portions of a wireless local-area network (LAN) in two different buildings though use of a microwave hop at 2390 MHz. Dishes for such hops are often placed on the roofs of buildings and pointed toward the horizon. Accordingly, CORF recommends that the Commission modify Section 15.321 of the Rules to provide that unlicensed PCS devices must not be operated in a manner that interferes with operations at the NAIC, and that any fixed user of such devices within 10 miles of the NAIC[3] must first coordinate such operations with the Arecibo Observatory. While such restrictions would protect valuable planetary research operations, they are sufficiently limited, geographically and technologically, to allow for unfettered use in a wide variety of unlicensed PCS services.

The remaining proposals previously suggested by CORF may no longer be necessary. In light of the allocations to the Amateur and Part 15 services, CORF is less concerned about harmonic

[3]The coordinates of the NAIC are 18°20'46" North latitude and 66°45'11" West longitude.

emissions from 2412-2418 MHz, as well as other terrestrial and aeronautical uses of the 2402-2417 MHz band. The remaining concerns can probably be resolved by private negotiation between the radio astronomy community and the manufacturers of the proposed PCS devices, hopefully leading to a joint petition for rulemaking to tighten standards for out-of-band and spurious emissions in these bands.[4]

III. Conclusion

The portion of the spectrum that is used by radio astronomers is a unique resource that has produced, and will continue to produce, remarkable cosmic discoveries, important information about our planet, and tangible technological benefits used in a variety of radio communications services. Yet, radio astronomers' use of this small fraction of the useable spectrum is uniquely susceptible to interference, and thus it must be carefully guarded in the coming years. The limited restrictions proposed herein will have little impact on the use of unlicensed PCS but will produce the substantial benefit of protecting valuable planetary research facilities in Arecibo, Puerto Rico. Therefore, CORF supports the Commission's proposal to prohibit

[4]Radio astronomers have already had informal discussions with representatives of Apple Corporation on these matters.

aeronautical use of unlicensed PCS devices operating at 2390-2400 MHz. In addition, CORF urges the Commission to protect the NAIC from interference from fixed unlicensed PCS users of that band within 10 miles of the facilities at Arecibo.

Respectfully submitted,
NATIONAL ACADEMY OF SCIENCES'
COMMITTEE ON RADIO FREQUENCIES

By: Bruce Alberts
Bruce Alberts
President

March 20, 1995

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